

Joseph Choma is an Assistant Professor of Architecture at Clemson University and the founder of the Design Topology Lab, an interdisciplinary design research practice. He is the author of *Morphing: A Guide to Mathematical Transformations for Architects and Designers* (Laurence King Publishing, January 2015) and *Études for Architects* (Routledge, forthcoming May 2017). His current research pursues the physical realization of mathematically defined structures and the advancement of design pedagogy through computational thinking. In 2013, Choma was awarded the Emerging Voices citation by AIA Atlanta. He completed his graduate studies in design and computation at Massachusetts Institute of Technology.

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

Master of Science in Architecture Studies, Design and Computation, 2011

(Full Tuition Merit Scholarship / GPA 5.0)

Rensselaer Polytechnic Institute, Troy, NY

Bachelor of Architecture, Minor in Studio Arts, 2009

(Rensselaer Medalist)

PROFESSIONAL

Design Topology Lab, May 2009 - Present, Founder

"...the first research practice dedicated to the ontology of space defined by mathematics."

-Archinect.com, August 18, 2011

SCULPTURE / OBJECTS AS ARCHITECTURE (Recent Work)

12' x 7' x 6', equation based geometry, compression only structure, robotically carved stone sculpture

(Work in progress / estimated date of completion: 2017)

Material: Valders stone

Fabrication team: Jim Durham, Alex Marshall, Brian Smith, Brock Hinze (Quarra Stone in Madison, WI)

Structural engineering team: Bruce Danziger and Allan Olson (Arup in Los Angeles, CA)

First mock-up fabricated in January 2016

Phase 01 - Engineering analysis completed in July 2016

Quarry visit and collaborative workshop in August 2016

Phase 02 - Engineering analysis completed in November 2016

DRAWING EXPERIMENTS / INSTALLATIONS (Recent Works)

Line 01, 6' x 8', Promenade Building in Atlanta, GA, 2013

Boundaries 02, 16' x 20', Barbara Archer Gallery in Atlanta, GA, 2013

Boundaries 01, 26' x 13', SP_ARC Gallery in Marietta, GA, 2012

INDUSTRIAL DESIGN / PRODUCTS (Recent Work)

Lotus, a glass fruit bowl (Prototype Phase)

Acconci Studio, July 2009 - August 2009, Designer

Ted Krueger, November 2008 - August 2009, Research Collaborator

Experimental Media and Performing Arts Center, May 2008 - October 2008, Curator / Designer

Gage Clemenceau Architects, March 2008, Facade Researcher

Acconci Studio, May 2007 - August 2007, Intern Designer

Carlos Zapata Studio, May 2006 - August 2006, Intern

ACADEMIC

Clemson University, July 2014 - Present

Assistant Professor of Architecture (Tenure-Track), June 2015 - Present

Visiting Lecturer, School of Architecture (Full-Time), July 2014 - May 2015

COURSES

Arch 2510: Architectural Foundations 1, Fall 2014, 2015, 2016 (Core design studio)

Arch 2511: Architectural Foundations 1 Laboratory: Digital Tooling, Fall 2014, 2015, 2016 (Core lab)

Arch 8100: Visualization and Representation 1, Fall 2015, 2016 (Required M.Arch. course)

Arch 2520: Architectural Foundations 2, Spring 2015, 2016, 2017 (Core design studio)

Arch 2521: Architectural Foundations 2 Laboratory: Digital Tooling 2, Spring 2015, 2016, 2017 (Core lab)
Arch 8110: Visualization and Representation 2, Spring 2016 (Required M.Arch. course)
Arch 4990 / 6990: Composites Manufacturing for Architectural Applications, Spring 2017 (Elective)
Industry funded elective with \$25,000 in materials.

SERVICE

Editor of *Poche'* -Clemson University Architecture's student publication, Spring 2016 - Present
Coordinator of 2nd Year Undergraduate Studios, Spring 2017 - Present
Member of the University's STEAM Task Force, Fall 2014 - Present
Member of the University's Interdisciplinary Academic Team, Fall 2015 - Present
Faculty and Student Advisory Committee (Second Year Faculty Representative), Fall 2015 - Spring 2016
Member of the Studio Learning Cultures Task Force, Fall 2015 - Spring 2016
Clemson Thinks 2 Instructor, Fall 2015 - Present
Member of the Digital Ecologies Certificate Program, Fall 2016 - Present
Member of Teaching Stream: Design, Fall 2016 - Present
Member of the NAAB Lee Hall Exhibit Committee, Spring 2016 - Spring 2017
Member of the Search and Screen Committee for Endowed Chair / Director of CU-iMSE, Fall 2016 - Spring 2017
On the doctoral committee of Mostafa Hashem, Spring 2015 - Present
Advising 25 undergraduate students, Fall 2015 - Present

Southern Polytechnic State University, July 2011 - May 2014 Assistant Professor of Architecture (Tenure-Track)

COURSES

Design Foundations 1, Fall 2011, 2012, 2013 (Core design studio)
Design Communications 1, Fall 2012 (Core elective)
Design Foundations 2, Spring 2012, 2013, 2014 (Core design studio)
Design Communications 2, Spring 2014 (Core elective)
Constrained to be Unconstrained, Spring 2012, 2013 (Advanced elective)
Environmental Technologies 1, Fall 2011, 2013 (Core elective)

SERVICE

Chair of Lecture, Workshop and Exhibition Series, Fall 2012 - Spring 2014
Coordinator of 1st Year, Fall 2012 - Spring 2014
Coordinator of Digital Fabrication Lab, Fall 2011 - Spring 2014
Member of University Information Technology Advisory Committee, Fall 2012 - Spring 2014
Member of Academic Council, Fall 2012 - Spring 2014
Member of Research Advisory Committee, Fall 2012 - Spring 2014
Member of Curriculum Development Committee, Fall 2012 - Spring 2014
Library Representative for the Architecture Program, Fall 2011 - Spring 2014
Member of Search and Screen Committee for Professor of History and Theory, Spring 2012
Co-Chair of Search and Screen Committee for Supervisor and Shop Manager, Spring 2012

Boston Architectural College, September 2010 - May 2011 Instructor, School of Architecture

COURSES

trans-FORM: Tacit to Explicit, Fall 2010, Spring 2011 (Advanced elective)

Massachusetts Institute of Technology, September 2009 - May 2011 Teaching Assistant, Department of Architecture

COURSES

MArch Level III Option Studio, Professor Andrew Scott (Director of MArch Program) Spring 2011
Digital Fab. & Construct: Apps Workshop, Professor Dennis Shelden (Gehry Technologies) Fall 2010
MA Level I Core Studio, Professor Ana Miljacki (Project_) Spring 2010
MArch Level II Core Studio, Professor Nader Tehrani (NADAAA) Fall 2009

SERVICE

Invited Guest Critic to various graduate architecture and art reviews.

AUTHORED BOOKS

Morphing: A Guide to Mathematical Transformations for Architects and Designers by Joseph Choma

Hardcover: 232 pages, 886 illustrations, 220mm x 220mm
Laurence King Publishing (2015)
ISBN 978-1-78067-4-131

Cylinders, spheres and cubes are a small handful of shapes that can be defined by a single word. However, most shapes cannot be found in a dictionary. They belong to an alternative plastic world defined by trigonometry: a mathematical world where all shapes can be described under one systematic language and where any shape can transform into another.

This visually striking guidebook clearly and systematically lays out the basic foundation for using these mathematical transformations as design tools. It is intended for architects, designers, and anyone with the curiosity to understand the link between shapes and the equations behind them.

Digital companion website and tool: www.morphingbook.com

Morphing Tool, designed and developed in collaboration with Xiaoji Chen (User Experience Designer, Microsoft)

REVIEW

"While the classic platonic shapes have a dictionary definition, the rise of parametric design has seen an infinity of new plastic mathematical forms around that have yet to be named. Joseph Choma, who graduated in computation at MIT, has thoughtfully managed not only to name but to ontologically order them into 13 mathematical 'transformations', so that seemingly random 3D forms can be broken down into their constituent parts. As if that isn't enough he also provides the trigonometric equations that define those transformations. This is a technical tome less for those thinking traditionally about 'form follows function' and more for those that think 'form follows $f(x)$ '"

-Jan-Carlos Kucharek (Senior Editor, Royal Institute of British Architects Journal)

IN THE NEWS (ONLINE / PRINT)

Book review in Journal of Mathematics and the Arts, October 24, 2016
Book review in Architectural Record, December 01, 2015
Book review in Architecture NZ Magazine, August 21, 2015
Book review in ARLIS/NA, July 25, 2015
Book review in RIBA Journal, May 13, 2015
Featured on RPI Alumni News, May 06, 2015
Book featured on ArchDaily, March 23, 2015
Book featured on Archinect, March 20, 2015
Interview published on Archinect, March 08, 2015
Book featured on suckerPUNCH, February 16, 2015

Études for Architects by Joseph Choma

Hardcover and paperback: 216 pages, 234mm x 156mm
Routledge (Under contract / May 2017)

Organized around a series of pedagogical exercises, this book provides a visual journey through a series of games architects can play as a means to design. Aimed specifically at beginning design students, learning objectives include: computational thinking and making, introduction to design as an iterative, reflective, and rigorous process, ideas of continuity and discontinuity, and understanding the bias and constraints of digital and analog tooling. The text is simple and straight forward to understand and in addition the author draws explanatory diagrams to elaborate on each exercise's description. He also includes visually compelling student work to provide insight into the possibilities of each exercise. Finally, the book includes eighteen case studies from Europe, the USA, Mexico and Asia to inspire and inform.

Poché Edited by Joseph Choma

Paperback: 220 pages, 9.2 in x 6.3 in
Clemson University Architecture (January 2017)

Poché is the "stuff" between the walls and floors. In plans and sections it is usually filled in or hatched. However, there is a lot that goes into that mysterious hatch. This publication literally cuts through required courses at Clemson University Architecture, as a means to pause and reflect.

100 Unfolded Polyhedra (Working title) by Joseph Choma

A work in progress
Book type: design guide / instructional catalog
Page count: 224 pages

When a polyhedron transforms, how does its unfolding pattern transform? In 1975, Geoffrey C. Shephard posed the question, "Does every 3-polytope possess a net?" This guide does not attempt to prove this open problem, but develops an intuitive correlation between these two worlds. Drawing relationships between deformed / irregular polyhedra and their flattened unfolded state. The examples within this book show strategies for avoiding overlapping while maintaining an optimized packing density. Within the book, each two dimensional crease pattern is documented adjacent to its three dimensional polyhedron. It is intended for architects, designers, and anyone interested in the construction of shapes with flat sheet material.

Shaping (Working title) by Joseph Choma

A work in progress
Book type: Children's Picture Book (Ages 7-9)
Page count: 30 pages

Within this picture book, a sphere transforms into a circle, which becomes a cone. The cone is then a triangle, which becomes a pyramid. The pyramid is then a square, which becomes a cube. After the cube is opened, it is a space similar to the room you are in now. Throughout this visual journey, shapes are juxtaposed to familiar objects. Projective geometry is the common transformation mechanism. It is intended for children, ages 7 to 9.

INVITED PUBLICATIONS (PEER REVIEWED)

Performative Materials in Arch. and Design, University of Chicago Press, Page 158-159, August 2013

Invited by Rashida Ng (Associate Professor, Temple University) and Sneha Patel

Cornell Journal of Architecture Issue 9: Mathematics, *T-H-I-C-K-E-N-I-N-G*, Page 191-199, March 2013

Invited by Caroline O'Donnell (Director of M.Arch. Program, Cornell University)

IN THE NEWS (ONLINE)

Journal featured on ArchDaily, June 06, 2013

Testing to Failure, SA+P Press, *Contested Boundaries*, Page 158-159, October 2011

Invited by Nader Tehrani (Head of the Department of Architecture, Massachusetts Institute of Technology)

Machinic Processes Architectural Biennial Beijing 2010 Students Catalog, October 2010

One of four projects selected to represent MIT in the Architectural Biennial Beijing.

PAPERS (PEER REVIEWED)

Inter. Journal of Interior Arch. + Spatial Design, *Objects to Atmospheres*, Page 22-25, August 2016

23% acceptance rate - Paper accepted and submitted

BLUR d3:dialog, Inter. Journal of Arch. + Design, *Boundaries 02*, Page 137-142, June 2016

SIGRADI 2010 Proceedings, *Digital Fabrication + Hand Craft*, Page 146-149, November 2010

Paper has been quoted/cited by Jonathon Anderson (Assistant Professor, University of Nevada, Las Vegas) and Ming Tang (Assistant Professor, University of Cincinnati) in their paper, *Crafting Soft Geometry* for the SIGRADI 2014 Conference.

CATALOGS (PEER REVIEWED)

ACADIA 2010 Catalog, *Contested Boundaries*, Page 146-149, October 2010

Research on *Packing Instability* and *Crafting Texture* published.

RUNE Journal 31, *Exploding Volume Packing*, Page 33, May 2010

The MIT Journal of Arts and Letters showcases vault packing drawing.

PROJECTS PUBLISHED WITHIN INTERNATIONAL MAGAZINES (PRINT)

Design Exchange Magazine, UK, *Wide Eyed*, Page 90-91, August 2009

Video exhibited at the *VISIONS Beyond Media Festival* in Florence was mentioned.

eVolo Magazine, USA, *Architecture Redefined*, Page 144-145, July 2009

Design machine housing concept published.

Plan Magazine, Ireland, *"Is the new Frank Gehry on..."*, Pages 89-91, September 2007

Article previewed on the cover of the magazine. Brief interview and showcased two images of a design project.

PROJECTS INCLUDED IN OTHER PUBLICATIONS

Glimpse, Clemson University's magazine of research and creative discovery, Page 67, Fall 2015

Introducing Joseph Choma to the Clemson community.

Design for the Children Book, *Play and Order*, Page 40, May 2010

Competition entry for a pediatric clinic in East Africa was published.

EMPAC OPEN Book, *Architecture and Design Exhibition*, Page 60-61, Fall 2008

Exhibit design published in this small promotional book.

Rensselaer Magazine, *2008 EOY Award*, Page 53, Fall 2008

Winning built chair design shown in an article.

Rensselaer Magazine, *Change the World Challenge Begins*, Page 9, Fall 2005

The five winners of a university wide competition were mentioned.

Rensselaer Magazine, *Students Design Homes for Haiti*, Page 5, Winter 2004

Winners of the student design competition were mentioned.

SOLO EXHIBITIONS

951 Boylston Street Lobby, Boston Architectural College, Boston

Architecture + Mathematics, November - February 2016

Barbara Archer Gallery, Atlanta

Object to Atmosphere, January - March 2013

IN THE NEWS (ONLINE)

Boundaries 02 (Drawing) featured on suckerPUNCH, February 02, 2013

Boundaries 02 (Drawing) featured on Archinect and Bustler, January 24, 2013

Architecture Exhibition Gallery, Southern Polytechnic State University, Marietta

Boundaries, January - February 2012

IN THE NEWS (ONLINE)

Boundaries (Drawing) featured on suckerPUNCH, March 12, 2012

Article written about installation on Designboom Magazine, March 01, 2012

Boundaries (Drawing) featured on Archinect and Bustler, February 07, 2012

Emerging Technologies Gallery, MIT Museum, Cambridge

Design for an Ideal Polling Booth, April - May 2010

Funded in part by two MIT Council for the Arts, Grant

Part of the 2010 Cambridge Science Festival

IN THE NEWS (ONLINE)

Interviewed on the Cambridge Science Festival Blog, April 20, 2010

Featured on MIT's homepage (www.mit.edu), *Today's Spotlight*, March 28, 2010

INVITED GROUP EXHIBITIONS

Promenade Building, Atlanta

Southern Fried Supernova, October 2013

IN THE NEWS (ONLINE)

Line 01 (Drawing) featured on Archinect and Bustler, October 21, 2013

Michael C. Carlos Museum at Emory University, Atlanta

Veneralia: Night of the Black Jaguar, May 2012

Swan Coach House Gallery, Atlanta

Architects as Artists, January - February 2012

Works, San José

Iraqi Memorial, November - December 2011

Project Space, The Elizabeth Foundation for the Arts, New York

Iraqi Memorial, September - October 2011

Department of Architecture, Massachusetts Institute of Technology, Cambridge

MIT 150, DCG Exhibit: Things to Think with, April - May 2011

Funded in part by a MIT Council for the Arts, "Special" Director's Grant

McCormick Gallery, Boston Architectural College, Boston

Build Boston, Change/Order Exhibit, November - December 2010

798 Space, Beijing, China

4th Architectural Biennial Beijing 2010, Machinic Processes, October 2010

Sheppard Fine Arts Gallery, University of Nevada, Reno

Iraqi Memorial, February - March 2010

Protospace, Bangalore, India

Spirited Caravans, Re-imagining Bangalore's Outdoors, July 2009

ARTWERX Gallery, Brighton, England

architectuREdefined, February 2009

GROUP EXHIBITIONS (PEER REVIEWED)

School of Architecture, Pratt Institute, Brooklyn

ACADIA 2010's Peer Reviewed Exhibition, October 2010

Tyler School of Art, Temple University, Philadelphia

Input_Output Exhibition, October - November 2010

Stazione Leopolda, Florence, Italy

VISIONS Beyond Media Festival, Wide Eyed, July 2009

INVITED LECTURES

Professor Ackerman's Generative Design Course, Boston Architectural College, Boston

Designing an Understanding, November 4, 2015

Fall 2014 Lecture Series, School of Architecture, Georgia Institute of Technology, Atlanta

Designing an Understanding, November 7, 2014

IN THE NEWS (ONLINE)

Lecture promoted on suckerPUNCH, October 31, 2014

The Computation Group Forum, Massachusetts Institute of Technology, Cambridge
Designing an Understanding, October 24, 2013

Museum of Design Atlanta's Field Trip Series, Barbara Archer Gallery, Atlanta
Object to Atmosphere, March 7, 2013

Spring 2012 Lecture Series, Dept. of Architecture, Southern Polytechnic State University, Marietta
Boundaries, January 23, 2012

The Computation Group Forum, Massachusetts Institute of Technology, Cambridge
Designing Pedagogy, November 4, 2011

Professor Nagakura's Design Scripting Course, Massachusetts Institute of Technology, Cambridge
For Loops, March 3, 2011

2010 Cambridge Science Festival, MIT Museum, Cambridge
Design for an Ideal Polling Booth, April 25, 2010

MIT DesComp 2010 Symposium, Massachusetts Institute of Technology, Cambridge
Exploding: Vault Packing, February 6, 2010

CONFERENCE PRESENTATIONS AND PANEL DISCUSSIONS (PEER REVIEWED)

ACADIA 2010, School of Architecture, The Cooper Union, New York
Contested Boundaries, October 23, 2010

Input_Output Symposium, Tyler School of Art, Temple University, Philadelphia
Contested Boundaries, October 8, 2010

PROFESSIONAL SERVICE

2017 ACMA Composites Challenge, Architectural Division
Organizer of Workshop and Kick-off Event, January 2017

Clemson University is one of the universities invited to enter this industry funded competition.
Additionally, Clemson is hosting the workshop for all participating schools at CU-ICAR.

ACADIA 2016, Taubman College of Architecture, University of Michigan, Ann Arbor
Member of the Scientific Committee, May 2015
Review paper and project submissions

INFORMAL WORKSHOPS AND DEMONSTRATIONS (OUTREACH)

2015 Artisphere, Greenville
Design with Mathematics, May 8-10, 2015

2015 Cambridge Science Festival, MIT Museum, Cambridge
Architecture + Mathematics, April 24, 2015

HONORARY AWARD

2013 Emerging Voices Award from the AIA Atlanta
Each year, the AIA Atlanta and Young Architects Forum of Atlanta recognizes one architect/designer in Atlanta.

PROFESSIONAL INTERNATIONAL COMPETITIONS

Pamphlet Architecture 33 Competition, Princeton Architectural Press, Spring 2012, **Shortlisted Entry**

Nominated by a previous Pamphlet Architecture author.

Design for the Children Competition, AIA Seattle, Spring 2009, **Notable Entry**

Sustainable, culturally responsive, pediatric clinic for East Africa.

Lead Designer, collaborated with Satoshi Kiyono, Eric Tan, Amy Latten, Josh Everard and Matt Gineo

The Porous City, Spring 2009, **Finalist**

Mobile cultural space in Bangalore, India. One of the fifteen finalists.

Iraqi Memorial, Spring 2009, **Top Juror's Selection**

"Metaphorical references to inflection, wind, and erosion are important to this artist's interventionist mark making. Inflexion would be an elegant scar on the surface of the earth that recalls the land-based practices of Dennis Oppenheim, Robert Morris, and Robert Smithson. Inflexion refers to the power of man to effect change, while suggesting that such alteration is also subject to natural forces beyond human control."

-Ann Wolfe (Curator of Exhibitions and Collections, Nevada Museum of Art)

eVolo 07 Housing Competition, Summer 2007, **Special Mention**

Considered one of the most prestigious digital architecture ideas competitions in the world.

184 projects from 36 different countries entered.

STUDENT DESIGN COMPETITIONS

Polling Booth Competition, Harvard GSD, Fall 2008, **Selected Project**

"Conceptually it acknowledges that the act of voting is a fiercely individual act, and the defensive structure serves to define a personal space/zone around the voter. I find the structure interesting from a formal and tectonic point view. Its center of gravity is high, and it necessarily 'stands' off the ground, on the thin support of tapered quills. I like the 'bed of nails' structural principle- whereby it stands because of the multiple improbable supports rather than a few obvious structural ones"

-Eric Howeler (Assistant Professor, Harvard University)

Collab Design Competition, Philadelphia Museum of Art, Fall 2008, **Third Place**

Designed and prototyped a bench for the museum. Awards presented by Frank Gehry.

Rensselaer Final Project Competition, Fall 2008, **Second Prize**

Annual internal competition for fifth year architecture students.

Bedford Traveling Fellowship, Summer 2008, Traveled to Tokyo, Kiyoto, Osaka

Selected to study the contemporary presence of the master builder -collaborations between engineers and architects in Japan. Visited the offices of SANAA, Toyo Ito, Arata Isozaki, Mutsuro Sasaki, Takenaka Corporation, and ARUP | Tokyo.

EOY Design Competition, Spring 2008, **Overall Winner**

Designed and fabricated a chair out of 1,000 ft of ethernet cable for CXtec.

Change the World Challenge Ideas Competition, Fall 2005, **Best Idea**

Collapsible disaster relief shelter. One of five students awarded within the entire university.

Haiti 8 x 8 x 40 Design Competition, Fall 2004, **Best Overall Design**

A school in Haiti constructed out of shipping containers. Winning design was built in Haiti.

Equal collaboration with Jason Beam, Elise DeChard and Elyse Spink.

GUEST CRITIC

Kennesaw State University, Michael Carroll's B.Arch. Studio, Final Review, Fall 2016

University of North Carolina at Charlotte, All 5th Year B.Arch. Studio, Final Review, Fall 2016

Kennesaw State University, Saleh Uddin's B.Arch. Studio, Final Review, Spring 2016

University of North Carolina at Charlotte, Jefferson Ellinger's B.Arch. Studio, Final Review, Fall 2015

Kennesaw State University, Edwin Akins' B.Arch. Studio, Final Review, Fall 2015

University of North Carolina at Charlotte, Jefferson Ellinger's B.Arch. Studio, Midterm Review, Fall 2015
University of North Carolina at Charlotte, CriticalMASS Graduate Research Symposium, Spring 2015
University of North Carolina at Charlotte, Kelly Carlson-Reddig's B.Arch. Studio, Final Review, Fall 2014
University of North Carolina at Charlotte, Jefferson Ellinger's B.Arch. Studio, Midterm Review, Fall 2014
Clemson University, Armando Montilla's M.Arch. Studio, Midterm Review, Spring 2014
Rensselaer Polytechnic Institute, All 2nd Year B.Arch. Studios, Final Review, Spring 2013
Georgia Institute of Technology, Volkan Alkanoglu's M.Arch. Studio, Midterm Review, Spring 2013
Rensselaer Polytechnic Institute, Francis Bitonti's B.Arch. Studio, Final Review, Fall 2012
Clemson University, Armando Montilla's M.Arch. Studio, Penultimate Review, Fall 2012